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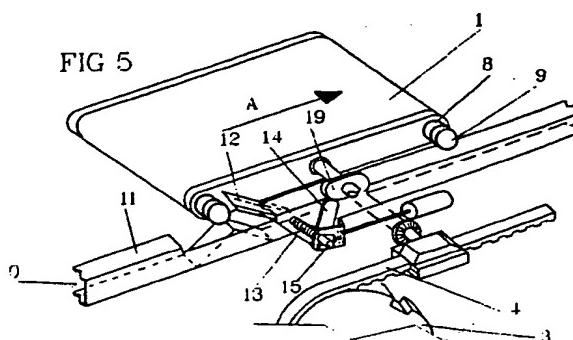
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(54) Handling-switching apparatus with conveyor tables apt to be inclined, with unloading actuating devices controlled by said conveyor tables.

(57) This invention proposes a handling-switching apparatus in which the pieces to be handled are placed on conveyor tables constituted by rotating carpets that are inclined and set to rotation to unload the piece into collecting vessels suitably preset.

Means are provided to control the unloading of the piece, that are operated and subsequently brought again to a non-operative position by the carriage itself while it moves forward, so as to avoid the risk of breakage.



EP 0 611 713 A2

This invention proposes a handling-switching apparatus including a number of conveyor tables, each constituted by a rotating carpet on which the piece to be handled is placed and that performs unloading into collecting vessels that are determined at the moment of introducing the piece into the machine, said collecting vessels being placed along the path below the carpets.

A handling-switching apparatus of this kind is already known from the Italian Patent Application No. MI91A2213 dated 06.08.1991, of the same applicant.

A characteristic of the handling-switching apparatus according to the invention is providing the means that place the carpet in an inclined position and set it to rotation such that they are directly operated by the carriage on which the carpet is mounted, so as to avoid the risk of breakages due to an untimely operation of the same.

More in detail in the handling-switching apparatus according to the invention each carpet is mounted on a carriage that is in turn provided with a central shaft connected to a pair of dragging chains.

The carpet supporting rollers are mounted on shafts that are fitted, on one side, with a pair of wheels, one of which is idle, that run on a rail track placed along the path, thereby keeping the carpet in the horizontal position.

Such rail track has some movable parts that are lifted at the moment of unloading, so as to engage the pair of wheels present at an end of the carriage, deviating it beneath the rail track, so as to bring the carriage in an inclined position.

The movements of the rail track movable section are controlled by a cam integrally connected with the carriage supporting shaft, while the return to the previous position is operated by the same wheels that are deviated towards the rail track lower part.

By this way the movements of the rail track movable part are directly controlled by the carriage involved in the unloading operation, thus avoiding the risk of breakages due, for instance, to a delayed operation of the movable wall.

This invention will now be described in detail, in a non-limiting example, referring to the attached figures, where:

Figure 1 is a perspective view of an apparatus according to the invention;

Figure 2 shows the detail of a carpet during the conveyed piece unloading step;

Figure 3 is the perspective view of a part of the carpet dragging devices in an apparatus according to the invention;

Figures 4 and 5 show the perspective view of the unloading operating devices during, respectively, the passage of a carriage not involved in

unloading and of a carriage that, on the contrary, must perform unloading;

Figures 6 and 7 are the side views of the unloading operating devices during two steps of said operation;

Figures 8 and 9 are the top plan views of the devices of figures 6 and 7;

Figure 10 is a vertical section of the machine according to the invention;

Figure 11 is the section of a detail of the machine in correspondence with the devices that drive the strip support during the passage of the carriage from forward to return path.

With reference to figure 1, the apparatus according to the invention is constituted by a number of conveyor tables, each indicated by 1, consisting of a series of rotating carpets arranged in two rows side by side, each row developing along a loop-shaped path, on a vertical plane.

The carpets move for instance in the direction of arrow A when they run along the upper section and move on the contrary in the opposite direction (arrow B) in the return section.

Forward (A) and return (B) paths are therefore superposed and the pieces to be handled are loaded on the machine while they follow the section connecting the forward to the return path.

Loading can then take place at both head ends of the machine, in correspondence with coding and loading stations of a known type and as schematically represented by arrows indicated by C in figure 1, in which an operator inputs into a computer that manages the apparatus the piece destination, for instance by means of a bar code or through the keyboard.

The operator places the piece on a tape which inserts it into the machine loading it onto the carpet that the computer has assigned to such specific piece while the carpet follows, as said, the connecting section between the going and return paths.

The carpets move in a substantially horizontal position and are inclined at the moment of unloading only, when they are also set to rotation in order to unload the piece.

The apparatus (see figure 3) includes a supporting frame 2 on which a pair of wheels 3 or the like are mounted, that drag as many chains or belts that in turn drag the carpets.

Wheels 3 are set to rotation on their axle by an electric motor 5.

Every carpet is mounted on a frame 6 (figure 2) which is in turn mounted on a shaft 7 that is engaged with belts 4. The belts therefore drag shafts 7, that in turn cause the frames 6 with carpets 1 to move forward.

Every carpet 1 is mounted on the respective frame 6 by means of a pair of idle rollers on the shafts of which as many pairs of wheels are moun-

ted: an internal wheel 8 integrally connected with the shaft and an external one, 9 which is idle.

Rail tracks substantially constituted by "C"-shaped profile irons are placed along the path, and during the carpet movement the wheels 8 and 9 normally lean on the upper flange 11 of such rail tracks (figure 4).

In such sections, consequently, the carriages keep in the horizontal position by virtue of the wheels that lean on the respective rail tracks.

Flange 11 is not continuous but has some movable parts, indicated by 12, which can be lifted and lowered.

A connecting rod 13 is hinged to each movable part or plate 12, said connecting rod being in turn hinged on a lever 14.

Lever 14 is mounted so as to slide on a supporting pin 15, relative to which it can move in opposition to elastic means, such as for instance a helical spring 16 or the like.

An L-shaped stirrup 17, operated by a piston 18, causes lever 14 to slide along pin 15, taking it from a position in which the lever is at a certain distance from rail track 10 (figure 4) to a closer position where lever 14 goes to interfere with the path of a cam 19 integrally connected with shaft 7 (figure 5).

During the carpet feed, cam 19 engages lever 14 causing it to rotate on pin 15 and operating by this way the connecting rod 13 to lift movable plate 12, as shown in figures 5 and 6.

Plate 12 has an appendix 20 that, following the plate rotation lowers and takes an inclined position inside the "C"-shaped profiled iron that constitutes rail track 10.

The "C"-shaped profiled iron has, in correspondence with the internal lower part, a raised section 21 on which idle wheel 9 leans when following the rail track internal section.

The wheel 8, which is integrally connected to the roller, shaft has a diameter slightly greater with respect to idle wheel 9.

Then, when the carriage is in an inclined position, with its wheels inside the "C"-shaped profiled iron as shown in figure 11, wheel 9 leans on relief 21 and pushes wheel 8 upwards, pressing it against the lower surface of flange 11, thus causing wheel 8 and the respective roller and the carpet to rotate by virtue of friction.

Operation goes on in the following way: when the carriage with the carpet that conveys the piece comes close to the assigned unloading area, the machine control devices operate piston 18 that causes stirrup 17 to rotate, which presses on lever 14 causing it to slide on pin 15 in opposition to the force exerted by spring 16, until it is brought in correspondence with the path of cam 19 which is integrally connected to shaft 7.

5 The latter, as a consequence of the carriage feed, engages lever 14 causing it to rotate and thereby operating connecting rod 13 to lift mobile wall 12, taking it to the position shown in figures 5 and 6.

10 Then the carriage itself operates the control means of mobile plate 12, thus avoiding the risk that the same be lifted untimely.

15 The rear wheel of the carriage (that proceeds according to arrow A) is then deviated by inclined wall 12 that directs it to the internal part of the "C"-shaped profiled iron, which causes the carpet to incline, taking it to the position of figures 2 and 7.

20 As the carriage proceeds, wheel 9 engages the appendix 20 of plate 12, taking it to the horizontal position and assuring by this way the continuity of the rail track when the successive carriage arrives.

25 The revolving speed of carpet 1 is a function of the dimensions of supporting rollers and relevant wheels 8, it is therefore possible, by properly sizing such elements, to cause the piece to be unloaded at zero absolute speed or at an extremely low speed.

30 When the carriage has proceeded by one step, the wheels inside the "C"-shaped profiled iron encounter an upward slope, indicated by 21 in figures 6 and 7, therefore they take the carriage back to the horizontal starting position.

35 A skilled person will then be able to plan many modifications and changes, that shall anyway be deemed to be all comprised within the scope of this invention.

### Claims

35 1. A handling-switching apparatus including a plurality of conveyor tables dragged along a fixed path, each conveyor table being consisting of a carriage dragged by means of a belt on which a rotating carpet is mounted that constitutes the conveying - unloading table for the piece and that is tilted rotation at the moment of unloading, characterized in that the means causing the carpet tilting actuating the unloading operation are operated by the carrying said carpet.

40 2. A handling-switching apparatus as claimed in claim 1, in which every carpet is mounted on the relevant carriage by means of a pair of idle rollers, on the shafts of which a pair of wheels are mounted that run on a rail track consisting of a "C"-shaped profiled iron, the wheels that normally leaning on the external surface of the upper flange of said profile iron, characterized in that said flange 11 has liftable sections 12, the opening of which is controlled by a cam 14 operated by the carpet carriage, said movable

wall 12 passing from a substantially horizontal closing position to an opening position in which it engages one of the pairs of wheels of said carriage, deviating it to the internal part of said "C"-shaped profiled iron, thereby bringing said carriage in an inclined position by rotation on supporting shaft 7.

3. A handling-switching apparatus as claimed in claim 2, characterized in that each pair of wheels mounted on the carpet supporting rollers shaft includes an idle wheel 9 and a wheel 8, said wheel 8 having a larger diameter and being integrally connected with said shaft, the internal part of the "C"-shaped profiled iron that constitutes the rail track being so shaped as to have a raised section 21 suitable to engage the idle wheel in order to keep wheel 8, which is integrally connected to the roller shaft, pressed against the rail track flange to control the carpet rotation.

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4. A handling-switching apparatus as claimed in claim 2, characterized in that said movable part 12 of the rail track has an appendix 20 that, when said movable part 12 is open, interferes with the path of the carriage wheel inside the "C"-shaped profiled iron, so to allow to control the closing of said movable part 12 by means of the very carriage wheels.

5. A handling-switching apparatus as claimed in any of the preceding claims, characterized in that said rail track movable part 12 is connected by means of a connecting rod with a cam that is mounted so as to slide on pin 15, a stirrup 17 being provided, controlled by piston 18, suitable to act on said cam 14 to move it, in opposition to the force exerted by elastic means, until it is brought to interfere with means 19 integrally connected with carriage supporting shaft 7.

6. A handling-switching apparatus as claimed in the preceding claims, characterized in that said carriages move along a path consisting of a loop developing on a vertical plane.

7. A handling-switching apparatus as described and illustrated.

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EP 0 611 713 A2

FIG. 1

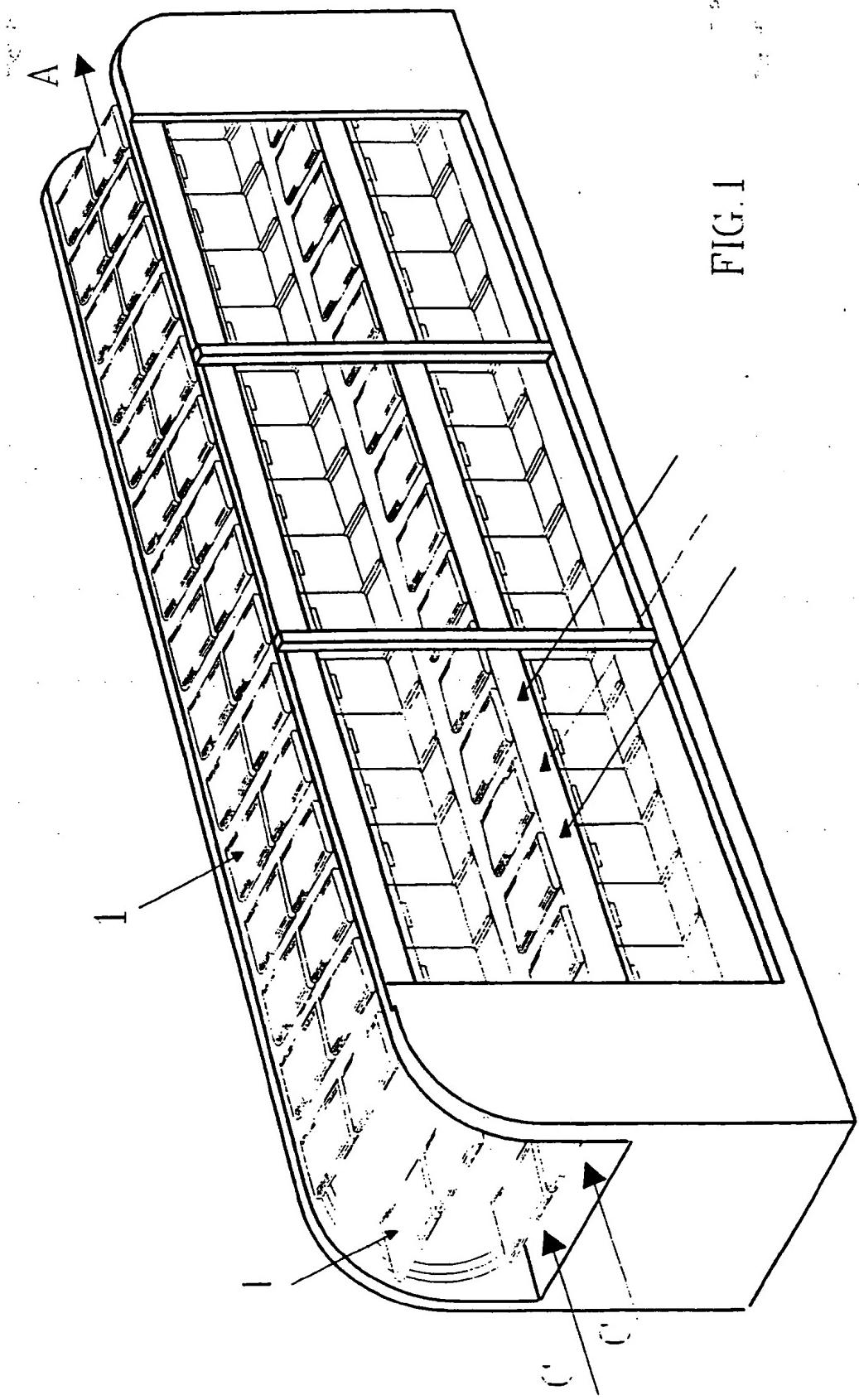


FIG 2

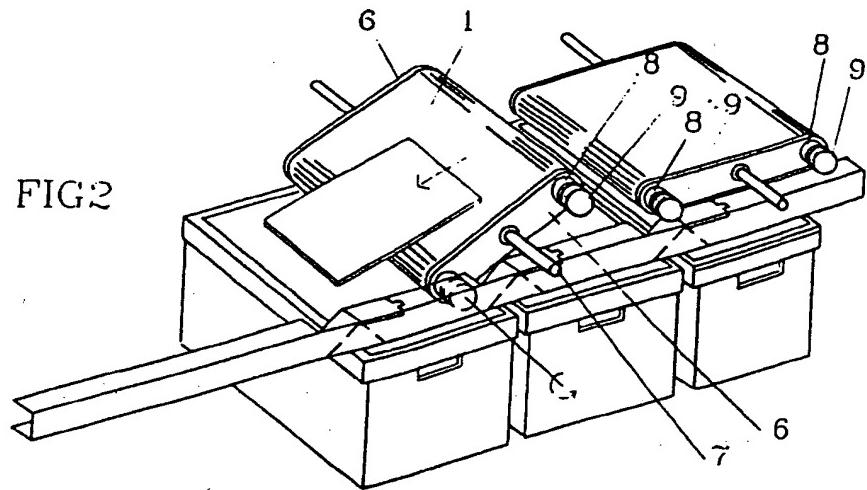
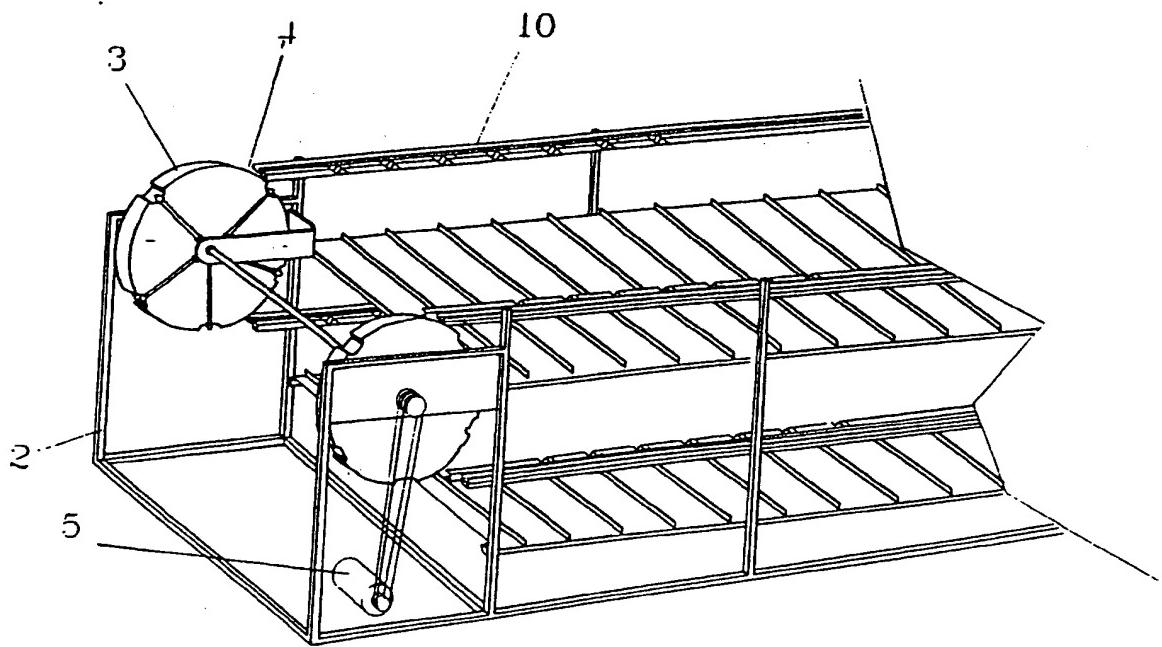


FIG. 3



EP 0 611 713 A2

FIG. 4

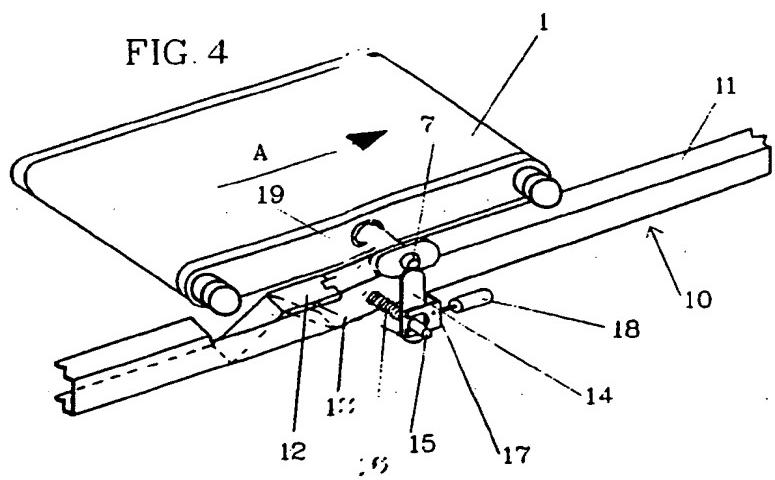
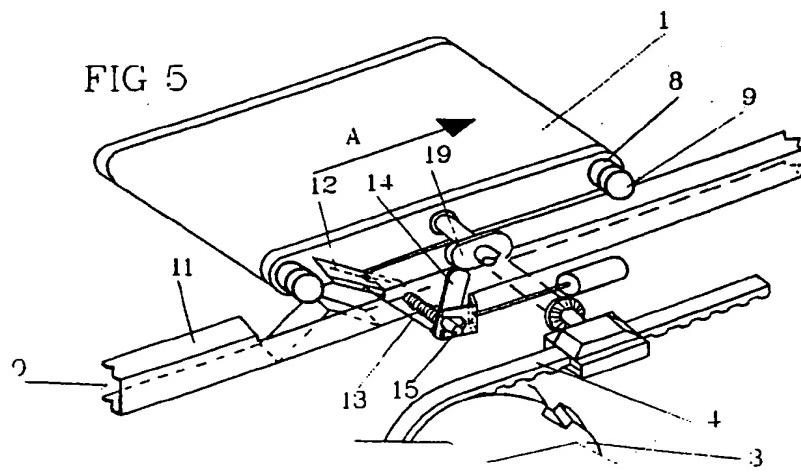


FIG. 5



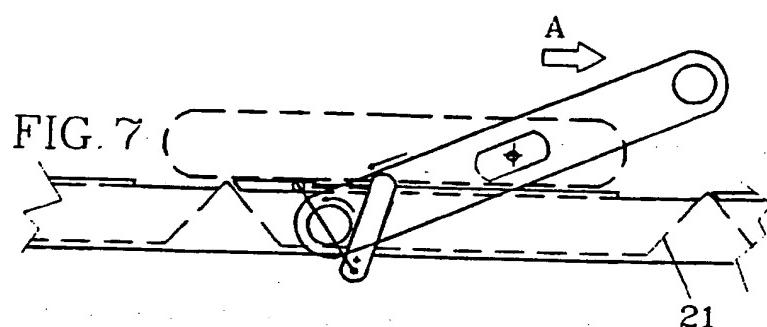
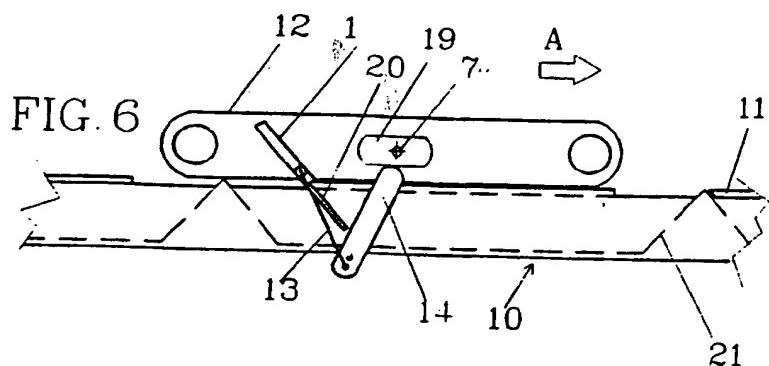


FIG. 8

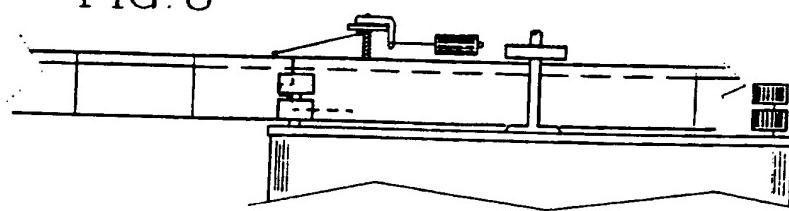
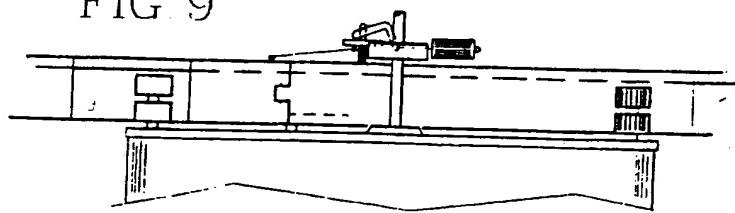


FIG. 9



EP 0 611 713 A2

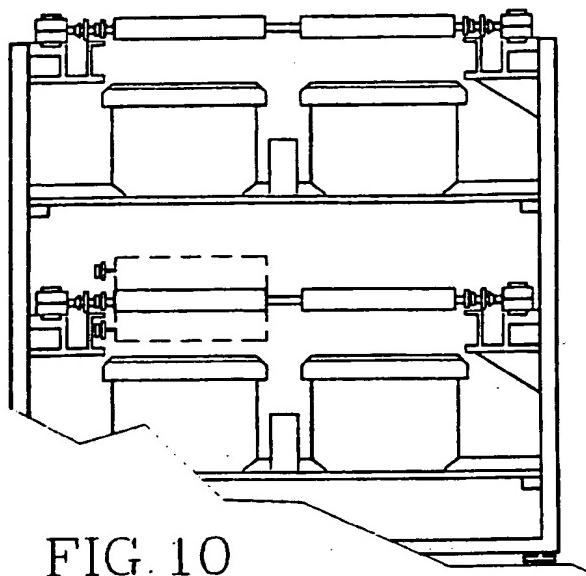


FIG. 10

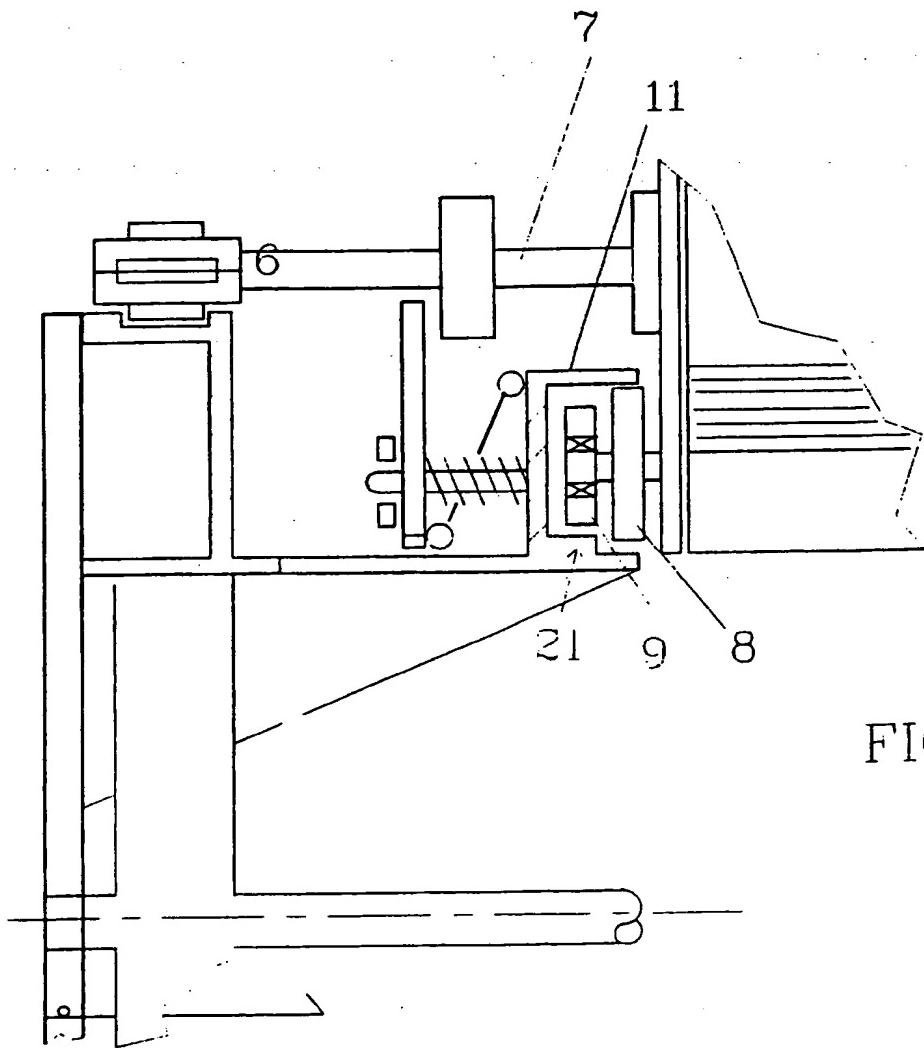


FIG 11

